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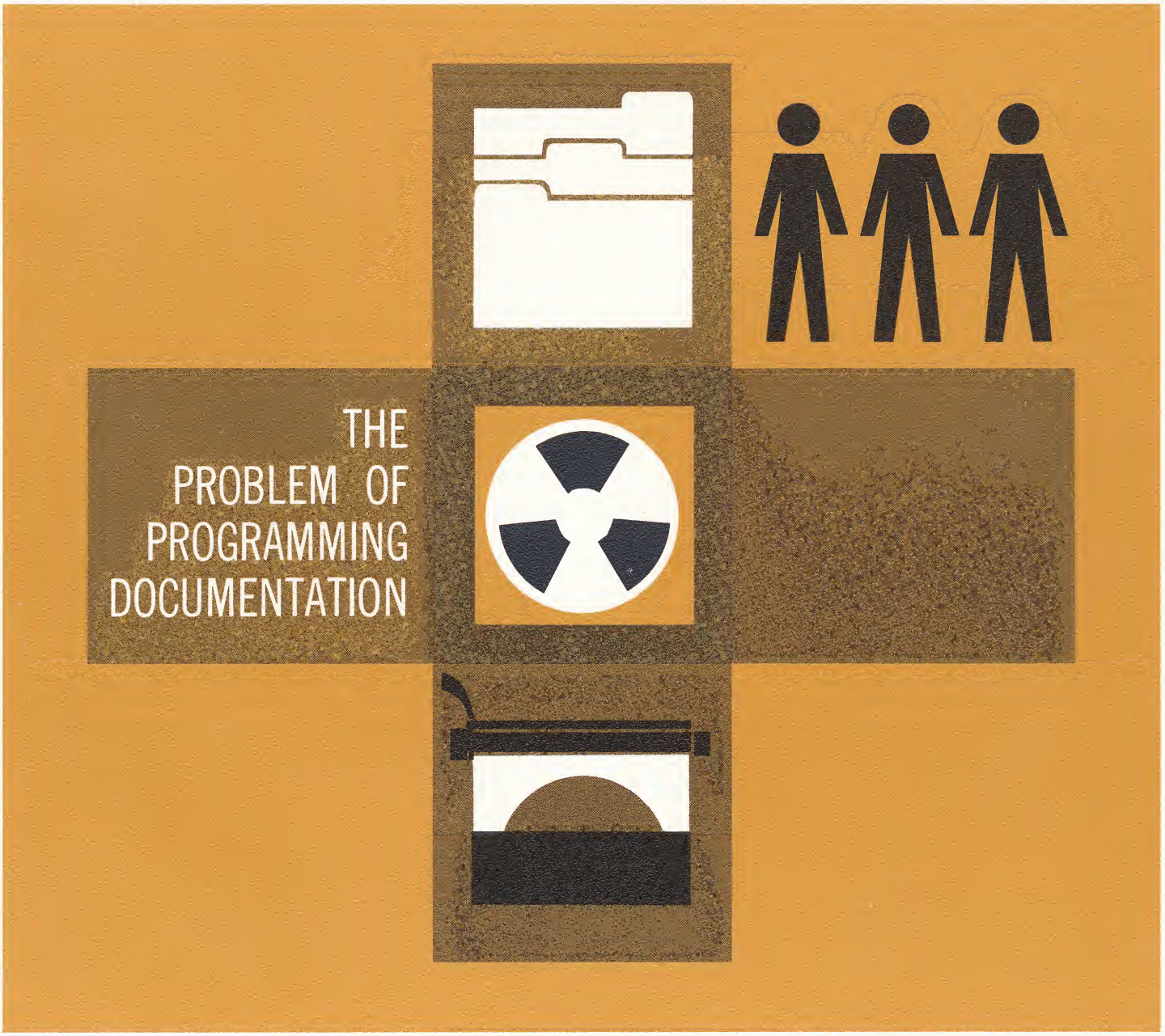
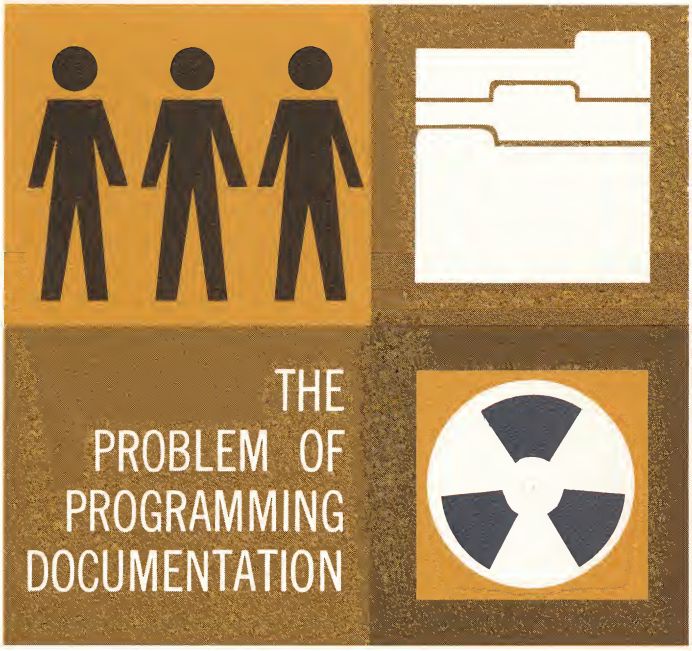
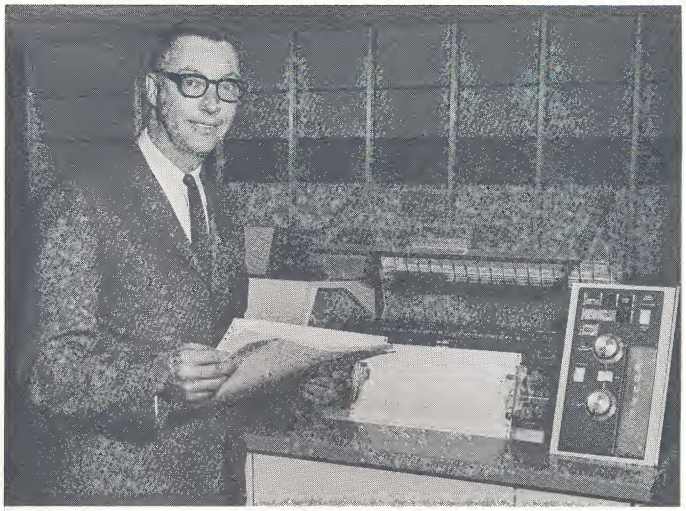
# CSC REPORT





*Mr. Irons has over eight years' professional experience in the technical development and management of large computer-based information systems for both industry and the government. Since joining CSC early in 1964, he has been primarily responsible for CSC's contractual commitments to the U.S. Navy. Prior to joining CSC, Mr. Irons was with Systems Development Corporation and Douglas Aircraft in Santa Monica, California.*

**By Frank Irons, Operational Systems Department**

The dynamic and often evolving nature of computer program systems, along with the increasing complexity of such systems and transient nature of programming personnel responsible for developing such systems, has created a critical need for accurate and detailed system documentation. This has been a long-standing problem in the short history of the computing industry, and is just now receiving the scrutiny and analysis it has long deserved.

There are those who feel that adequate documentation of computer programs and program systems is a luxury to be enjoyed only if costs and schedules permit, and that what is most important is that the programs work. It generally happens, however, that the program doesn't work at first and that modifications, new requirements, and restatements or clarifications of requirements arise. Lacking adequate documentation, these activities require a greater amount of manpower and a lengthier schedule than should be necessary.

Additional arguments also arise as to the functions that a programmer is required to perform. There are people in the industry who hold that documentation of computer programs by programmers is unessential, a waste of time, a function not suitable to the temperament of programmers, etc. These arguments become short-lived upon close inspection and proper definition. Just as the engineer is required to prepare plans, descriptions, standards, requirements, and operating procedures, so must the programmer. The totality of the programmer's task includes many phases of the use and preparation of documentation.

The manner by which such documentation is produced is not a question in this article. Means for producing adequate documentation range from manual to completely automated machine methods. The point at issue, however, is the recognition of the need for documentation, the standards and guidelines under which they are produced, the basic content requirements, and, most importantly, the kinds of documentation essential to implementation and maintenance of computer program systems.

Recent contractual efforts by CSC have had the sole purpose of defining for clients the kinds of computer program documentation required for their program systems. Further, these efforts included analysis of the role documentation plays in managing the implementation and maintenance of program systems. These efforts have added to the already extensive system development experience of CSC staff members, and have expanded CSC's understanding and competence in developing total computer program system requirements, and in managing their implementation.

Each computer program system has a varying need for documentation, based on the peculiarities of the given system. The specific documentation segments, however, should not vary significantly. The following are the kinds of documentation requirements that will in general satisfy the documentation needs of most computer-based systems. This documentation must adequately support the areas of computer program development, design, production, test, operations, and maintenance.

### Computer Program Performance Specifications

These specifications are prepared by senior computer programmer analysts in conjunction with client participation and approval. They describe, in operational, functional, and mathematical language, the performance requirements that are necessary to fulfill the mission or operation for which the computer program system is to be developed. Adequately prepared, they describe the requirements or "wants" of the customer. Further, they may serve as the controlling documentation, or baseline, to expedite procurement, control design, and control design change, and form a basis upon which satisfactory completion and quality of the resultant computer program system may be measured. All subsequent activity must be based upon a com-

plete understanding of these specifications by both the customer and the production activity.

**Computer Program Design Specifications**

These specifications translate the functionally organized performance specifications into discreet computer program tasks. Whereas the performance specifications were written in functional and operational terms, the computer program design specifications are written in programming terminology, after receipt of the performance specification. The design specifications serve as the controlling documents for the functional allocation of program tasks to individual computer programs, and for the identification of anticipated storage requirements, timing restrictions, sequencing requirements, executive control features, and data base definitions.

**Computer Subprogram Specifications**

For each discrete task or set of functionally related tasks, as described in the Computer Program Design Specification, a computer subprogram or subroutine is generated. Each of these program segments requires a detailed specification describing the exact manner in which the delegated functions are performed. The subprogram specification will therefore contain a detailed technical description of its responsibilities, structure, operating environment, constraints, data organization, etc. Accompanying each computer subprogram will also be diagrammatic and narrative flows, source-statements, machine-language listings, and miscellaneous material to further aid in fully describing the subprogram. The narrative description of the subprogram is a detailed, step-by-step description of the program logic, and is amplified by an accompanying flow diagram which, because of its brevity, is most useful as a pictorial adjunct to the narrative or prose description.

**Computer Program Operator's Manual**

Technical manuals which describe the procedural aspects of operation of the program system are required to assure effective utilization of the computer and the program during actual operations. The contents of such manuals must provide the computer operators and other users with the necessary information to allow proper and efficient operating procedures to be followed for computer program and system monitoring, set-up, initialization, and error recovery, and for performing diagnostic or maintenance functions.

**Computer Program Test Plans**

The planning, scheduling, and detailed development of an orderly, well-defined computer program testing process is essential to the acquisition, acceptance, and maintenance of any computer program system. Test planning should occur prior to production of the computer programs, and is in large part governed by the system's performance criteria given in the Computer Program Performance Specifications. Test plans should be prepared whenever possible with customer personnel, but should, as a minimum, be subject to customer review and approval. Test plans should define the requirements and schedule for all levels of testing, commencing with individual subprogram tests and concluding with plans for design verification and system integration tests.

**Computer Program Test Specifications**

The computer program test specification represents a further detailing of information contained in the test plan and is the vehicle used to specify the detailed test design and schedule considerations. Test specifications are prepared for each level of testing upon approval of the overall test plan, and prior to the start of the specific test activity. Test specifications will include detailed considerations of the test management, methods to be used, personnel requirements, hardware requirements, and auxiliary support programs. Each test specification will detail the precise test procedure and functions to be tested, planned inputs and expected outputs, analysis and/or debriefing methods, etc.

**Conclusion**

The technical documents summarized above serve as essential instruments for ongoing and subsequent activities performed by both client and contractor personnel. Adequate documentation is mandatory for program development, as well as for diagnosing troubles and designing and implementing modifications to the computer program system. In addition, it facilitates the rapid completion of training requirements for personnel at various levels of interface with the resulting computer program.

Where such documentation has not been produced, resultant attempts to recapture the ideas and efforts of previous work have proved futile. Ground previously covered must once again be traversed, and the costs originally saved by producing inadequate documentation seldom cover this later expense.

Management must recognize the need for proper documentation of computer program systems. This recognition must encompass adequate planning which provides for the materials, manpower, and schedules necessary to produce the required documentation. In addition, management must provide the necessary procedural environment and controls to encourage all participants in a computer program development effort to communicate via accurate, clear, concise, and totally descriptive computer program system documentation.

## PENDLEY NAMED ASSISTANT MANAGER OF COMMERCIAL APPLICATIONS

H. Foster Pendley was appointed Assistant Manager of the Commercial Applications Department of CSC's Los Angeles Division early this month. Mr. Pendley will work directly for Robert Bohrer, Manager of the department.

A veteran of over nine years in the field of Commercial Data Processing, Mr. Pendley has been a member of the staff of CSC's San Francisco office since December of 1963. During this time he has been Project Leader on the design of a material procurement and inventory system for a major Aerospace firm and a consolidated corporate accounting system for a large industrial concern.

Prior to joining CSC, Mr. Pendley held various technical and supervisory positions with General Dynamics/Astronautics, U.S. Steel Corporation, and the J. M. Huber Corporation. He holds degrees from the Tennessee Polytechnic Institute and the University of Pittsburgh.

## AMERICAN SAVINGS AND LOAN INSTALLS CSC REPORT SYSTEM

CSC recently implemented a Market Penetration System for American Savings and Loan Association in Whittier, California. The new IBM 1440 computer program currently prepares monthly reports on all new mortgages granted in Los Angeles County by institutional lenders, but is written to allow for eventual reporting on a multi-county basis.

Monthly activity on individual lenders and lender groups is reported first by submarket area, then consolidated for lending area, and finally for county. Maintenance of a running history file allows for smoothing of trend and portfolio analyses.

## CSC SELECTED BY AEC TO ESTABLISH DATA PROCESSING CENTER

Computer Sciences Corporation has been selected by the Atomic Energy Commission for negotiation of a contract for the establishment of a NORTHWEST COMPUTER SCIENCES CENTER in Richland, Washington. The new center will service the computing and data processing needs of the AEC and its contractors in Richland, as well as other computer users in the Pacific Northwest. CSC representatives began contract negotiations with the AEC in Richland this month. The facility is expected to be operational on or about July 1, 1965.

Computer service is now provided to the AEC Hanford Project from a centralized facility with a staff of approximately 125 people operated by the General Electric Company. Every effort will be made to use personnel presently employed in the General Electric facility.

The principal equipment in the present data processing center at Richland consists of an IBM 7090 computer system. CSC will continue to operate this complex and will also install more powerful computing equipment to provide for current requirements and expansion of capacity to serve other organizations in the Pacific Northwest. The initial estimated annual operating costs for the account of the AEC will be $1.5-million, while additionally anticipated revenues will bring the total to the $3-million per year level during the five-year AEC contract term.

In announcing the contract negotiation, representatives of the Atomic Energy Commission indicated that CSC was selected on the basis of its capability of meeting all Hanford data processing requirements, as well as its announced intention to attract industrial work to help broaden the business base in the Richland area. One of the features of CSC's operations in the Richland area will be the installation of a remote computing capability. Under this concept, firms throughout the entire Pacific Northwest area will be given the opportunity of sharing in the benefits of a powerful computer system on an as-needed basis, with turnaround times greatly lower than those available by any other method.

## ROHR AIRCRAFT SIGNS FIRST REMOTRAN CONTRACT

Rohr Aircraft Corporation of San Diego this month became the first client of CSC's new REMOTRAN computation concept. The San Diego firm has agreed to a cooperative marketing venture under which it will allow firms in the San Diego area to use its Univac 1004 satellite computer installation for direct linkage to CSC's Univac 1107 in El Segundo. Users of the center will also be allowed to utilize the Univac 1004 as a stand-alone, self-contained processor.

Over 75 representatives of leading industrial and commercial organizations in the San Diego area attended a live demonstration of the REMOTRAN concept at Rohr's facility in nearby Chula Vista. During the demonstration, a wide range of commercial and scientific programs was processed in a real-time mode over the telecommunication link.

The new system permits customers to introduce card decks of programs and transactions from remote stations, monitor the compilation or assembly of the programs, and execute solutions as if the 1107 were located at the remote facility. They enjoy the full benefits of use of a large-scale processor while avoiding the full monthly rental cost, site preparation, and maintenance incidental to normal commitment.

## CSC ANNOUNCES ACQUISITION OF POTTER AERONAUTICAL CORPORATION

An agreement was announced this month under which CSC will acquire the Potter Aeronautical Corporation of Union, New Jersey. The acquisition will be through the exchange of an undisclosed amount of CSC stock for all the issued and outstanding stock of Potter Aeronautical.

Potter Aeronautical specializes in the design and development of precision-engineered flow-measurement devices and related electronic instrumentation. Potter's market includes the petrochemical and brewing industries, as well as aerospace applications of its proprietary designs. In the aerospace field, Potter products have been aboard every major U. S. space vehicle, from the original Redstone launch to and including the Gemini manned space flight system. The company has the only flow-measurement system approved by the U. S. Department of Sanitation for use in food processing areas such as the dairy and brewing industries. Potter products are under license to such organizations as DeHavilland, Minneapolis-Honeywell, and A. O. Smith.

In announcement of the acquisition plan, CSC President Fletcher Jones stated that Potter Aeronautical will continue its operations as a subsidiary of CSC and that no management or personnel changes are contemplated for the immediate future. Mr. Jones stated that "a high level of benefit will be derived from a combination of the computer systems technology with instrumented devices requiring computer monitoring and control." "The combination of these technical capabilities," Mr. Jones continued, "will allow CSC to provide the process control and aerospace fields with a capability not now offered by any other firm."

Pending final audit results, Mr. Jones declined to state current revenue and profit levels for Potter Aeronautical, but described Potter Aeronautical's revenue forecast for the fiscal year beginning April 2, 1965 to be "in excess of $4 million."

## PROJECT FISCAL YEAR 1966 SALES OF OVER $30 MILLION

Officers of CSC recently projected revenues from CSC operations, not including Potter Aeronautical, of over $30 million for the fiscal year ending March 31, 1966. This projection was based on the receipt of orders in excess of $20 million during the three months ending March 31, 1965.

## GERALD ECKERMANN NAMED MANAGER, ADMINISTRATIVE SERVICES

CSC has appointed Gerald Eckermann to the newly created position of Manager, Administrative Services. His duties will include employment, wage and salary, and personnel administration, as well as supervision of the travel and purchasing functions.

Mr. Eckermann was formerly employed by General Dynamics/Convair as a Senior Wage and Salary Analyst. A veteran of five years' service as a Navy officer, he is a graduate of UCLA in Business Administration.

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